Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (Canceled).

Claim 2 (Currently Amended): A system to generate and detect x-rays comprising:

a cathode structure having a plurality of individually electrically addressable field emissive electron sources defining a plurality of cathodes, each cathode disposed on a first side of the cathode structure;

a target structure having a deflection surface facing the first side of the cathode structure, the deflection surface defining a target;

an object positioner disposed within an imaging zone; and

a detector structure to receive and detect an x-ray from the target,

wherein each cathode comprises a substrate and a gate electrode positioned parallel to and insulated from the substrate, the substrate comprising a field emissive material having an emitted electron current density of at least $1mA/cm^2$ when the cathode is subjected to an applied electrical field of at least $2V/\mu m$,

wherein the field emissive material is selected from the group consisting of single walled carbon nanotubes, double walled carbon nanotubes, multi-wall carbon nanotubes, nanotubes comprising at least one non-carbon element, or a nanorod/nanowire comprising at least one of a metal, a metal oxide, silicon, silicon carbide, silicon oxide, carbon nitride, boron nitride, boron carbide, or a chalcogenide.

Claim 3 (Previously Presented): The system of claim 2, wherein each of the plurality of cathodes is a recessed well in the cathode structure and into which the substrate is disposed, and the gate electrode is disposed across the surface of the substrate substantially equidistant from the substrate.

Claim 4 (Previously Presented): The system of claim 2, wherein the plurality of cathodes are each individually positioned on the first surface of the cathode structure at a predetermined interval.

Claim 5 (Previously Presented): The system of claim 4, wherein the predetermined interval is approximately 10° to 120°.

Claim 6 (Previously Presented): The system of claim 2, wherein the target is an area array of target material or a plurality of individual target material.

Claim 7 (Previously Presented): The system of claim 2, further comprising:

an evacuated chamber substantially in the form of a hollow cylinder having an inner wall and an outer wall and adapted to position an object to be imaged by the structure within the imaging zone.

Claim 8 (Previously Presented): The system of claim 7, further comprising:

a plurality of collimating windows disposed in the inner wall.

Claim 9 (Previously Presented): The system of claim 2, wherein the target is an area array of individual target material or a line array of target material.

Claim 10 (Previously Presented): The system of claim 2, wherein the detector is a charged-coupled device.

Claim 11 (Canceled).

Claim 12 (Currently Amended): A method of generating an x-ray image comprising the steps of:

positioning an object within an imaging zone;

switching each of a plurality of cathodes on a cathode structure at a predetermined frequency to field emit an electron, each of the plurality of cathodes individually addressable and electrically switched in a programmable sequence to field emit electrons toward an incidence point on a target structure, ~~the~~ each cathode

comprising a field emissive electron source including a field emissive material having an emitted electron current density of at least 1mA/cm^2 when the cathode is subjected to an applied electrical field of at least 2V/μm;

emitting an x-ray from a target of the target structure at the predetermined frequency;

imaging the object; and

detecting the emitted x-ray,

wherein a position on the target structure from which the x-ray emits corresponds spatially and temporally to a position on the cathode structure from which the electron emits,

wherein at least one of a circumferential position and an elevation angle of the emitted x-ray is sufficiently discriminated with respect to the object to produce a three dimensional image, and

wherein the field emissive material is selected from the group consisting of single walled carbon nanotubes, double walled carbon nanotubes, multi-wall carbon nanotubes, nanotubes comprising at least one non-carbon element, and nanorods/nanowires comprising at least one of a metal, a metal oxide, silicon, silicon carbide, silicon oxide, carbon nitride, boron nitride, boron carbide, or a chalcogenide.

Claim 13 (Previously Presented): The method of claim 12, wherein the predetermined frequency is in the range of 0.1 Hz to 100 kHz.

Claim 14 (Previously Presented): The method of claim 12, wherein the predetermined frequency is sufficiently rapid to dynamically image a physiological function.

Claim 15 (Previously Presented): The method of claim 12, wherein the electron is non-divergent and accelerated from a field emissive material toward a gate electrode and impacts the target at an incidence point.

Claim 16 (Previously Presented): The method of claim 12, wherein the step of emitting an x-ray forms a pencil-like x-ray beam, the x-ray beam corresponding to one or more pixels of a detecting means utilized in the step of detecting.

Claim 17 (Original): The method of claim 16, wherein the x-ray beam corresponds to no more than ten pixels.

Claim 18 (Previously Presented): The method of claim 12, wherein the step of emitting an x-ray forms a fan-like x-ray beam, the x-ray beam corresponding to one or more lines of pixels of a detecting means utilized in the step of detecting.

Claim 19 (Original): The method of claim 18, wherein the x-ray beam corresponds to a line of no more than ten lines of pixels.

Claim 20 (Previously Presented): The method of claim 12, wherein the step of emitting an x-ray forms a cone-like x-ray beam, the x-ray beam corresponding to an area of no more than 128x128 square pixels of a detecting means utilized in the step of detecting.

Claim 21 (Original): The method of claim 20, wherein the x-ray beam corresponds to an area of no more than 64x64 square pixels.

Claim 22 (Previously Presented): The method of claim 12, wherein a detecting means used in the step of detecting is a charge-coupled device.

Claim 23 (Previously Presented): The method of claim 12, further comprising a step of transferring a detected image resulting from the step of detecting to a computer storage device and refreshing a detecting means for a next image.

Claim 24 (Canceled).

Claim 25 (Canceled).

Claim 26 (Currently Amended): A structure to generate x-rays comprising:

a plurality of individually electrically addressable electron sources defining a plurality of cathodes;

at least one target placed opposing the cathodes; and

an evacuated chamber that houses the plurality of cathodes and the at least one target,

wherein the electron sources are field emission electron sources,

wherein each electron field emission source is a triode-type comprising a field emissive material having an emitted electron current density of at least $1mA/cm^2$ when the cathode is subjected to an applied electrical field of at least $2V/\mu m$ and a gate electrode positioned parallel to and insulated from a substrate,

wherein a plurality of electrons are field emitted from the cathode when the electric field between the gate electrode and the field emissive material exceeds a threshold value,

wherein the plurality of field emitted electrons pass the gate electrode and are further accelerated to impact on the at least one target by an electric field applied between the gate electrode and the at least one target,

wherein, upon impact, at an incidence point, at least one x-ray having a characteristic wavelength corresponding to a material of the at least one target and at least one x-ray having a continuous wavelength are generated, and

wherein the field emissive material is selected from the group consisting of single walled carbon nanotubes, double walled carbon nanotubes, multi-wall carbon nanotubes, nanotubes comprising at least one non-carbon element, and nanorods/nanowires comprising at least one of a metal, a metal oxide, silicon, silicon carbide, silicon oxide, carbon nitride, boron nitride, boron carbide, or a chalcogenide.

Claim 27 (Previously Presented): A structure to generate x-rays comprising:

a plurality of individually electrically addressable electron sources defining a plurality of cathodes;

at least one target placed opposing the cathodes; and

an evacuated chamber that houses the plurality of cathodes and the at least one target,

wherein the electron sources are field emission electron sources, and

wherein the field emissive material is selected from the group consisting of single walled carbon nanotubes, double walled carbon nanotubes, multi-wall carbon nanotubes, nanotubes comprising at least one non-carbon element, and nanorods/nanowires comprising at least one of a metal, a metal oxide, silicon, silicon carbide, silicon oxide, carbon nitride, boron nitride, boron carbide, or a chalcogenide.

Claim 28 (Previously Presented): The structure of claim 27, wherein the field emissive material is coated on the substrate as a film, is embedded in a matrix of the substrate, or is a free-standing substrate structure, and the gate electrode is disposed across a surface of the substrate substantially equidistant from the substrate.

Claim 29 (Previously Presented): The structure of claim 27, further comprising:

an evacuated chamber with a plurality of x-ray transparent windows, each window positioned to allow the passage of at least one x-ray beam generated by a plurality of electrons from a corresponding one of the plurality of cathodes,

wherein the plurality of cathodes and the at least one target are disposed within the evacuated chamber and the evacuated chamber is operationally maintained at a pressure lower than 10^{-3} Torr.

Claim 30 (Previously Presented): The structure of claim 27, wherein the plurality of cathodes and the at least one target are each on an opposing plane and the target has a deflection surface that is oriented toward a surface of the plurality of cathodes that emits electrons.

Claim 31 (Original): The structure of claim 30, wherein the deflection surface is oriented non-parallel to the surface of the plurality of cathodes.

Claim 32 (Original): The structure of claim 30, wherein each of the plurality of cathodes are individually positioned on one of the opposing planes at a pre-determined interval.

Claim 33 (Previously Presented): The structure of claim 27, wherein the plurality of cathodes are disposed on a first ring and the at least one target is disposed on a second ring, the first and second rings concentric, and the at least one target has a deflection surface that is oriented toward a surface of the plurality of cathodes that emits electrons.

Claim 34 (Original): The structure of claim 33, wherein the deflection surface is oriented non-parallel to the surface of the plurality of cathodes.

Claim 35 (Original): The structure of claim 33, wherein each of the plurality of cathodes are individually positioned on one of the first or second rings at a pre-determined interval.

Claim 36 (Currently Amended): A device to record x-ray images, comprising:

an x-ray source comprising a plurality of individually electrically addressable electron sources defining a plurality of cathodes, the plurality of cathodes disposed on a face of a first planar surface, at least one target disposed on a second planar surface, a deflection surface of the second planar surface opposing the face of the first planar surface, and an evacuated chamber that houses the plurality of cathodes and the at least one target;

an array or matrix of x-ray detectors or x-ray sensitive films opposing the x-ray source, the array or matrix substantially parallel to and at equal distance to the x-ray source; and

an object positioner placed between the x-ray source and the array or matrix,

wherein the plurality of cathodes includes a field emissive material having an emitted electron current density of at least $1mA/cm^2$ when the cathode is subjected to an applied electrical field of at least 2V/μm selected from the group consisting of single walled carbon nanotubes, double walled carbon nanotubes,

multi-wall carbon nanotubes, nanotubes comprising at least one non-carbon element, or a nanorod/nanowire comprising at least one of a metal, a metal oxide, silicon, silicon carbide, silicon oxide, carbon nitride, boron nitride, boron carbide, or a chalcogenide.

Claim 37 (Original): The device of claim 36, wherein the deflection surface is oriented substantially parallel to the face of the plurality of cathodes that emits electrons.

Claim 38 (Original): The device of claim 36, wherein each of the plurality of electron sources are individually positioned at a pre-determined interval on the face of the plurality of cathodes.

Claim 39 (Original): The device of claim 36, wherein the x-ray source further comprises a plurality of x-ray transparent windows disposed in a wall of the evacuated chamber, and a plurality of parallel collimators, at least one parallel collimator on each one of the plurality of x-ray transparent windows.

Claim 40 (Original): The device of claim 36, wherein the object positioner is movable with respect to the x-ray source.

Claim 41 (Previously Presented): The device of claim 36, wherein the detector is a charged coupled device.

Claim 42 (Currently Amended): A method to obtain an x-ray image, the method comprising:

placing an object in an x-ray source, the x-ray source comprising a plurality of individually electrically addressable electron sources defining a plurality of cathodes, the plurality of cathodes disposed on a face of a first planar surface, at least one target disposed on a second planar surface, a deflection surface of the second planar surface opposing the face of the first planar surface, and an evacuated chamber that houses the plurality of cathodes and the at least one target, an array or matrix of x-ray detectors or x-ray sensitive films opposing the x-ray

source, the array or matrix substantially parallel to and at equal distance to the x-ray source, and an object positioner placed between the x-ray source and the array or matrix;

applying power to at least one of the plurality of cathodes to generate x-ray radiation for a pre-set exposure time;

exposing the object to the x-ray radiation; and

capturing an x-ray image corresponding to the object by either the x-ray detectors or the x-ray sensitive films,

wherein the plurality of cathodes includes a field emissive material having an emitted electron current density of at least 1mA/cm^2 when the cathode is subjected to an applied electrical field of at least 2V/μm selected from the group consisting of single walled carbon nanotubes, double walled carbon nanotubes, multi-wall carbon nanotubes, nanotubes comprising at least one non-carbon element, or a nanorod/nanowire comprising at least one of a metal, a metal oxide, silicon, silicon carbide, silicon oxide, carbon nitride, boron nitride, boron carbide, or a chalcogenide.

Claim 43 (Original): The method of claim 42, wherein the power is applied to all of the plurality of cathodes simultaneously.

Claim 44 (Original): The method of claim 42, wherein the power is applied to a subset of the plurality of cathodes sequentially at a pre-set or variably-set frequency.

Claim 45 (Original): The method of claim 44, further comprising:
moving or activating the x-ray detectors or the x-ray sensitive films at a corresponding frequency to the pre-set or variably-set frequency to capture the x-ray image.

Claim 46: (Previously Presented): The method of claim 42, wherein a detecting means used in the step of detecting is a charge-coupled device.

Claim 47 (Original): The method of claim 42, further comprising a step of transferring a detected image resulting from the step of detecting to a computer storage device and refreshing a detecting means for a next image.

Claim 48 (Currently Amended): A device to generate x-ray images comprising:

an x-ray source comprising a plurality of individually electrically addressable electron sources defining a plurality of cathodes, the plurality of cathodes disposed on a surface of a first ring, at least one target disposed on a second ring, a deflection surface of the second ring opposing the surface of the first ring, and an evacuated chamber that houses the plurality of cathodes and the at least one target;

an array or matrix of x-ray detectors or x-ray sensitive films on a surface opposing the x-ray source, the array or matrix substantially concentric to and at equal distance to the x-ray source; and

an object positioner placed between the x-ray source and the array or matrix,

wherein the plurality of cathodes includes a field emissive material having an emitted electron current density of at least 1mA/cm^2 when the cathode is subjected to an applied electrical field of at least 2V/μm selected from the group consisting of single walled carbon nanotubes, double walled carbon nanotubes, multi-wall carbon nanotubes, nanotubes comprising at least one non-carbon element, or a nanorod/nanowire comprising at least one of a metal, a metal oxide, silicon, silicon carbide, silicon oxide, carbon nitride, boron nitride, boron carbide, or a chalcogenide.

Claim 49 (Original): The device of claim 48, wherein the first and second ring are concentric.

Claim 50 (Original): The device of claim 48, wherein each of the plurality of electron sources are individually positioned at a pre-determined interval on the surface of the ring.

Claim 51 (Previously Presented): The device of claim 48, wherein the x-ray source further comprises a plurality of x-ray transparent windows disposed in a wall of the evacuated chamber and a plurality of parallel collimators, at least one parallel collimator on each one of the plurality of x-ray transparent windows.

Claim 52 (Original): The device of claim 48, wherein the object positioner is movable with respect to the x-ray source.

Claim 53 (Previously Presented): The device of claim 48, wherein the detector is a charged coupled device.

Claim 54 (Currently Amended): A method to obtain an x-ray image, the method comprising:

placing an object in an x-ray source, the x-ray source comprising a plurality of individually electrically addressable electron sources defining a plurality of cathodes, the plurality of cathodes disposed on a surface of a first ring, at least one target disposed on a second ring, a deflection surface of the second ring opposing the surface of the first ring, and an evacuated chamber that houses the plurality of cathodes and the at least one target, an array or matrix of x-ray detectors or x-ray sensitive films on a surface opposing the x-ray source, the array or matrix substantially concentric to and at equal distance to the x-ray source, and an object positioner placed between the x-ray source and the array or matrix;

applying power to all of the plurality of cathodes to generate x-ray radiation for a pre-set exposure time;

exposing the object to the x-ray radiation; and

capturing an x-ray image corresponding to the object by either the x-ray detectors or the x-ray sensitive films,

wherein the plurality of cathodes includes a field emissive material <u>having an emitted electron current density of at least 1mA/cm^2 when the cathode is subjected to an applied electrical field of at least 2V/μm</u> selected from the group consisting of single walled carbon nanotubes, double walled carbon nanotubes, multi-wall carbon nanotubes, nanotubes comprising at least one non-carbon element, or a nanorod/nanowire comprising at least one of a metal, a metal oxide,

silicon, silicon carbide, silicon oxide, carbon nitride, boron nitride, boron carbide, or a chalcogenide.

Claim 55 (Original): The method of claim 54, wherein the power is applied to all of the plurality of cathodes simultaneously.

Claim 56 (Original): The method of claim 54, wherein the power is applied to a subset of the plurality of cathodes sequentially at a pre-set or variably-set frequency.

Claim 57 (Original): The method of claim 56, further comprising:

moving or activating the x-ray detectors or the x-ray sensitive films at a corresponding frequency to the pre-set or variably-set frequency to capture the x-ray image.

Claim 58 (Previously Presented): The method of claim 54, wherein a detecting means used in the step of capturing an x-ray image is a charge-coupled device.

Claim 59 (Original): The method of claim 54, further comprising a step of transferring a detected image resulting from the step of capturing an x-ray image to a computer storage device and refreshing a detecting means for a next x-ray image.

Claim 60 (Previously Presented): The system of claim 2, wherein the cathode structure is stationary within the system.

Claim 61 (Previously Presented): The system of claim 2, wherein the field emissive electron sources are stationary within the system.

Claim 62 (Previously Presented): The system of claim 10, wherein the charge-coupled device is stationarily positioned to detect the x-ray.

Claim 63 (Previously Presented): The method of claim 12, wherein the cathode structure is stationary with respect to the target structure.

Claim 64 (Previously Presented): The method of claim 22, wherein the charge-coupled device is stationarily positioned to detect the emitted x-ray.

Claim 65 (Previously Presented): The structure of claim 26, wherein the cathode structure is stationary within the structure to generate x-rays.

Claim 66 (Previously Presented): The method of claim 27, wherein the cathode structure is stationary within the structure to generate x-rays.

Claim 67 (Previously Presented): The device of claim 36, wherein the plurality of electron sources are stationary within the x-ray source.

Claim 68 (Previously Presented): The device of claim 41, wherein the detector is stationary with respect to the x-ray source.

Claim 69 (Previously Presented): The method of claim 42, wherein the plurality of electron sources are stationary within the x-ray source.

Claim 70 (Previously Presented): The method of claim 46, wherein the charge-coupled device is stationarily positioned to detect the emitted x-ray.

Claim 71 (Previously Presented): The device of claim 48, wherein the plurality of electron sources are stationary within the x-ray source.

Claim 72 (Previously Presented): The device of claim 53, wherein the charge-coupled device is stationarily positioned to detect the x-ray.

Claim 73 (Previously Presented): The method of claim 54, wherein the plurality of electron sources are stationary within the x-ray source.

Claim 74 (Previously Presented): The method of claim 58, wherein the charge-coupled device is stationarily positioned to detect the x-ray radiation.

Claim 75 (New): The system of claim 2, wherein an applied electrical field of greater than 2 V/μm produces a stable current density of at least about 100 mA/cm^2.

Claim 76 (New): The method of claim 12, wherein an applied electrical field of greater than 2 V/μm produces a stable current density of at least about 100 mA/cm^2.

Claim 77 (New): The structure of claim 26, wherein an applied electrical field of greater than 2 V/μm produces a stable current density of at least about 100 mA/cm^2.

Claim 78 (New): The structure of claim 27, wherein an applied electrical field of greater than 2 V/μm produces a stable current density of at least about 100 mA/cm^2.

Claim 79 (New): The device of claim 36, wherein an applied electrical field of greater than 2 V/μm produces a stable current density of at least about 100 mA/cm^2.

Claim 80 (New): The method of claim 42, wherein an applied electrical field of greater than 2 V/μm produces a stable current density of at least about 100 mA/cm^2.

Claim 81 (New): The device of claim 48, wherein an applied electrical field of greater than 2 V/μm produces a stable current density of at least about 100 mA/cm^2.

Claim 82 (New): The method of claim 54, wherein an applied electrical field of greater than 2 V/μm produces a stable current density of at least about 100 mA/cm^2.

Amendments to the Drawings:

The attached new drawing sheet includes new FIG. 9. FIG. 9, which corresponds to FIG. 4 of U.S. Patent Application No. 09/679,303, now U.S. Patent No. 6,553,096 and the parent application to this application, which was expressly incorporated into this application by reference upon filing, is a graph depicting the threshold field required to obtain a certain emitted current density for several field emission materials.

Attachment: New Drawing Sheet